CURRENT CLAIMS

1 (Amended). A method for treating or preventing pathophysiological consequences of mitochondrial respiratory chain dysfunction in a mammal comprising administering to said mammal in need of such treatment or prevention an effective amount of a pyrimidine nucleotide precursor, thereby treating or preventing said consequences; wherein said effective amount is from 0.05 to 0.3 grams of said precursor per kilogram body weight per day.

2. A method as in claim 1 wherein said respiratory chain dysfunction is caused by a mutation, deletion, or rearrangement of mitochondrial DNA.

3. A method as in claim 1 wherein said respiratory chain dysfunction is caused by defective nuclear-encoded protein components of the mitochondrial respiratory chain.

4. A method as in claim 1 wherein said respiratory chain dysfunction is caused by aging.

5. A method as in claim 1 wherein said respiratory chain dysfunction is caused by administration of cytotoxic cancer chemotherapy agents to said mammal.

6. A method as in claim 1 wherein said respiratory chain dysfunction is a

deficit in mitochondrial Complex I activity.

7. A method as in claim 1 wherein said respiratory chain dysfunction is a deficit in mitochondrial Complex II activity.

8. A method as in claim 1 wherein said respiratory chain dysfunction is a deficit in mitochondrial Complex III activity.

9. A method as in claim 1 wherein said respiratory chain dysfunction is a deficit in mitochondrial Complex IV activity.

10. A method as in claim 1 wherein said respiratory chain dysfunction is a deficit in mitochondrial Complex V activity.

11. A method as in claim 1 wherein said pyrimidine nucleotide precursor is selected from the group consisting of uridine, cytidine, an acyl derivative of uridine, an acyl derivative of cytidine, orotic acid, an alcohol ester of orotic acid, or a pharmaceutically acceptable salt thereof.

12. A method as in claim 11 wherein said pyrimidine nucleotide precursor is an acyl derivative of cytidine.

13. A method as in claim 11 wherein said pyrimidine nucleotide precursor is an acyl derivative of uridine.

14. A method as in claim 11 wherein said acyl derivative of uridine is 2', 3', 5'-tri-O-acetyluridine.

15. A method as in claim 11 wherein said acyl derivative of uridine is 2',3',5' -tri-O-pyruvyluridine.

16. A method as in claim 11 wherein the alcohol substitutent of said alcohol ester of orotic acid is ethanol.

17. A method as in claim 11 wherein said pyrimidine nucleotide precursor is cytidine diphosphocholine.

18. A method as in claim 11 wherein said pyrimidine nucleotide precursor is administered orally.

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20. A method as in claim 1 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is a congenital mitochondrial disease.

21. A method as in claim 20 wherein said congenital mitochondrial disease is selected from the group consisting of MELAS, LHON, MERRF, NARP, PEO, Leigh's Disease, and Kearns-Sayres Syndrome.

22. A method as in claim 1 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is a neurodegenerative disease.

23. A method as in claim 22 wherein said neurodegenerative disorder is Alzheimer' s Disease.

24. A method as in claim 22 wherein said neurodegenerative disorder is Parkinson's disease.

25. A method as in claim 22 wherein said neurodegenerative disorder is Huntington's Disease.

26. A method as in claim 22 wherein said neurodegenerative disorder is age-related decline in cognitive function.

27. A method as in claim 1 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is a neuromuscular degenerative disease.

28. A method as in claim 27 wherein said neuromuscular degenerative disease is selected from the group consisting of muscular dystrophy, myotonic dystrophy, chronic fatigue syndrome, and Friedreich's Ataxia.

29. A method as in claim 1 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is developmental delay in cognitive, motor, language, executive function, or social skills.

30. A method as in claim 1 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is selected from the group consisting of epilepsy, peripheral neuropathy, optic neuropathy, autonomic neuropathy, neurogenic bowel dysfunction, sensorineural deafness, neurogenic bladder dysfunction, migraine, and ataxia.

31. A method as in claim 1 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is selected from the group consisting of renal tubular acidosis, dilating cardiomyopathy, hepatic failure, and lactic acidemia.

32 (Amended). A method for preventing death or functional decline of post-mitotic cells in a mammal due to mitochondrial respiratory chain dysfunction comprising administration of an effective amount of a pyrimidine nucleotide precursor, thereby

preventing said death or functional decline; wherein said effective amount is from 0.05 to 0.3 grams of said precursor per kilogram body weight per day.

33. A method as in claim 32 wherein said post-mitotic cells are neurons.

34. A method as in claim 32 wherein said post-mitotic cells are skeletal muscle cells.

35. A method as in claim 32 wherein said post-mitotic cells are cardiomyocytes.

36 (Amended). A method for treating developmental delay in cognitive, motor, language, executive function, or social skills in a mammal comprising administration of an effective amount of a pyrimidine nucleotide precursor, thereby treating said developmental delay; wherein said effective amount is from 0.05 to 0.3 grams of said precursor per kilogram body weight per day.

37. A method as in claim 36 wherein said developmental delay is pervasive developmental delay or PDD-NOS.

38. A method as in claim 36 wherein said developmental delay is Attention Deficit/Hyperactivity Disorder.

39. A method as in claim 36 wherein said developmental delay is Rett's Syndrome.

40. A method as in claim 36 wherein said developmental delay is autism.

41. A method for reducing side effects of cytotoxic cancer chemotherapy agents by administering a pyrimidine nucleotide precursor, where said cytotoxic chemotherapy agent is not a pyrimidine nucleoside analog, thereby reducing said side-effects; wherein said effective amount is from 0.05 to 0.3 grams of said precursor per kilogram body weight per day.

42. A method as in claim 41 wherein said side effects of cytotoxic cancer chemotherapy are selected from the group consisting of peripheral neuropathy, chemotherapy-induced menopause, chemotherapy-associated fatigue, and depressed appetite.

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45. A pharmaceutical composition comprising:

(a) a pyrimidine nucleotide precursor or a pharmaceutically acceptable salt thereof, and

(b) pyruvic acid, a pharmaceutically acceptable salt thereof, or a pyruvic acid ester.

46. A method as in Claim 1 further comprising administering pyruvic acid, a pharmaceutically acceptable salt thereof, or a pyruvic acid ester.